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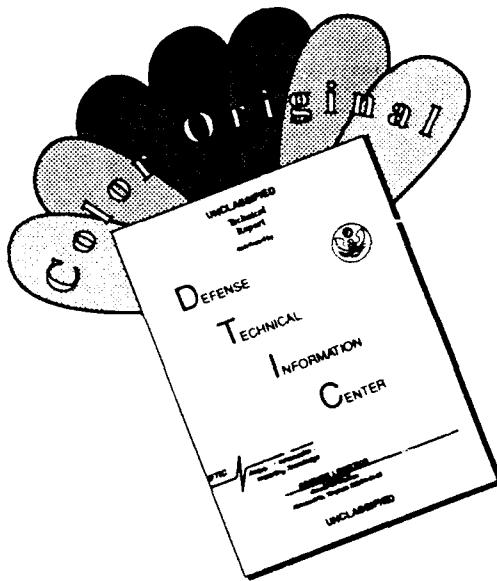
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SECURITY CLASSIFICATION OF THIS PAGE

## REPORT DOCUMENTATION PAGE

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) The geology of the Yatesville Lake Dam site and a discussion of how the engineered structures were adopted to the existing foundation conditions is the purpose of this report. Yatesville Dam is located in Eastern Kentucky, near the town of Louisa. Geologically, the area lies within the Cumberland Plateau Section of the Appalachian Plateau Physiographic province. The Pennsylvanian Age rocks are mostly sandstones, shales, coal, and siltstone. The principal features of this work are: a rock-fill dam with a central impervious core, a concrete intake structure, an uncontrolled spillway, a maintenance building, and a paved access road and parking area. The report describes in detail the procedures used to es- tablish foundation grades, excavate and treat the foundation. Pertinent correspondence relating to foundation conditions along with one volume of typical foundation treatment photographs is included. Geologic cross-sections and boring logs are part of this report.			
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# **YATESVILLE LAKE**

**BIG SANDY RIVER BASIN**

**BLAINE CREEK, KENTUCKY**

## **FOUNDATION REPORT**

### **VOLUME II**

**CONSTRUCTION OF DAM AND APPURTENANT WORKS, PHASE II**

**Contract No. DACW69-86-C-0039**

Huntington District  
U. S. Army Corps of Engineers  
Huntington, West Virginia



Foundation Report

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**SEPTEMBER 1990**

Foundation Report

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**Yatesville Lake, Phase II**  
**Big Sandy River Basin**  
**Blaine Creek, Kentucky**

**FOUNDATION REPORT**  
**VOLUME II - PHOTOGRAPHS**

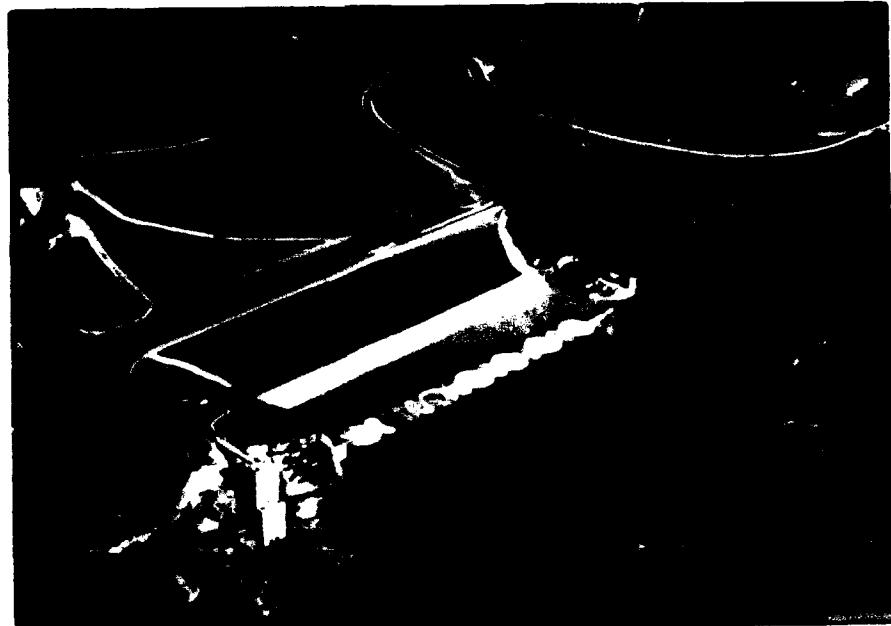
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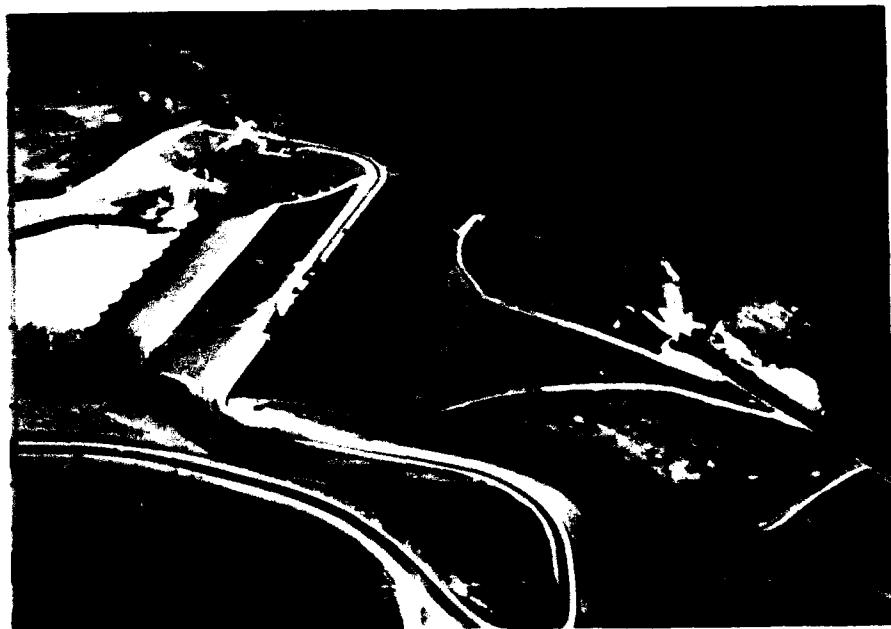
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GENERAL



Dec 1988 - Nearly completed dam, cofferdam, intake structure and maintenance building, aerial photograph, viewed from upstream.



Dec 1988 - Nearly completed dam and outlet works, aerial photograph, viewed from downstream.



27 May 1986, Initial construction at dam site, left abutment.

Aug 1986, Initial construction at spillway, prior to rock excavation.



19 May 1986, Initial construction at dam site, right abutment.

20 Mar 1987, Initial construction at intake structure.

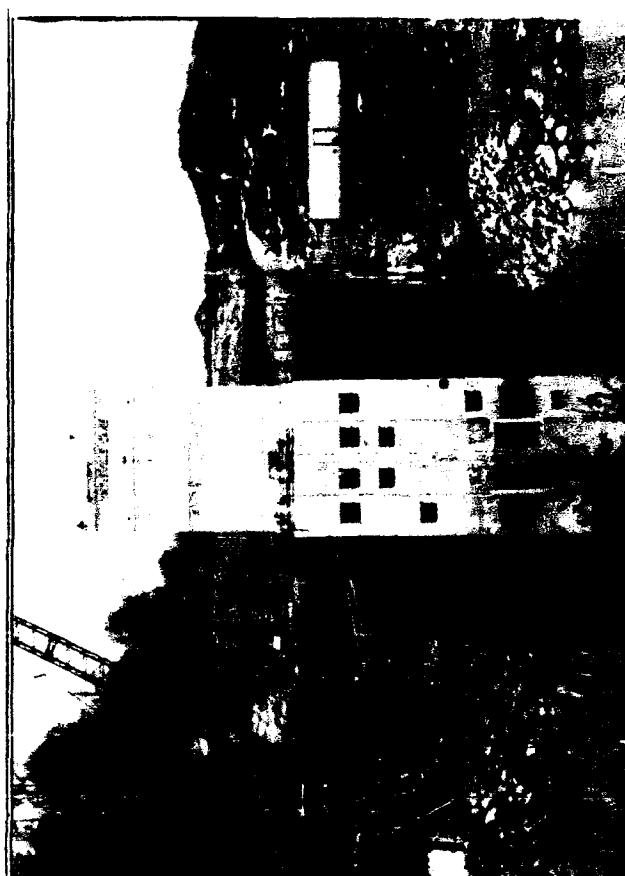


GENERAL



16 Nov 1988, Completed dam embankment, viewed from left abutment.

6 May 1988, Nearly completed intake structure.



16 Nov 1988, Completed dam embankment, downstream slope, viewed from left abutment.

4 Sep 1988, Nearly completed spillway.



GENERAL



30 July 1986, Exploratory core drilling, inclined hole, at spillway.

23 Sep 1987, Exploratory core drilling at valley bottom of dam, Longyear 44 drill.



28 Sep 1987, Exploratory drilling broken zones in the valley bottom of dam.

28 Sep 1987, 4-inch core recovered from exploratory hole #6, located in the valley bottom of dam.





30 Nov 1987, Foundation for core of dam, right abutment



11 Nov 1987, Foundation for core of dam, right abutment



30 Nov 1987, Foundation for core of dam, left abutment



16 Mar 1988, Foundation for core of dam, left abutment



9 Sept 1988, Station 1+24 - 1+58, bench elevation 677,  
viewed from D/S

10 Aug 1988, Station 1+98 - 2+09, bench elevation 644-645  
viewed from D/S



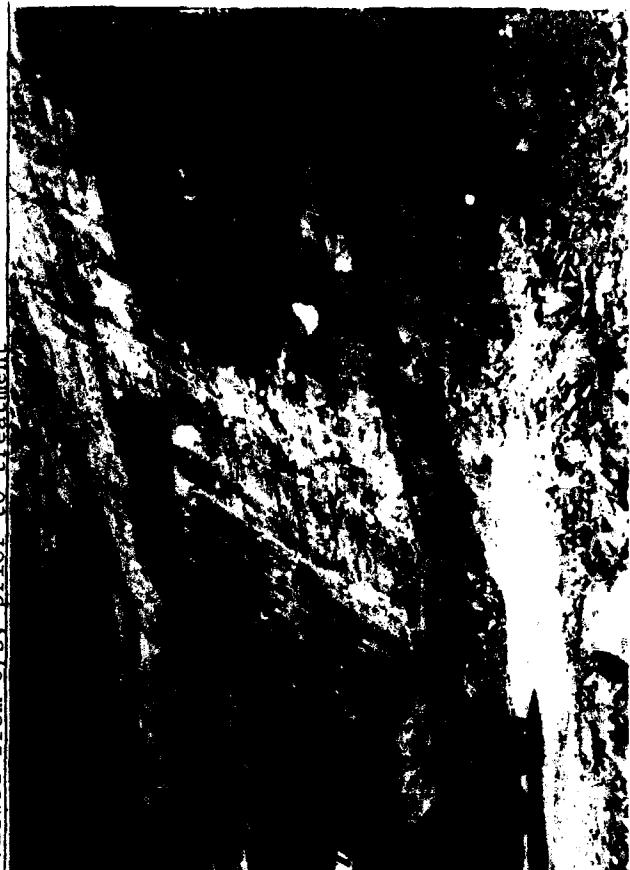
10 Aug 1988, Station 1+58 - 1+98, slope elevations 645-677,  
viewed from U/S

10 Aug 1988, Station 1+98 - 2+09, bench elevation 644-645,  
viewed from D/S





19 Jul 1988, Station 2+09 - 2+32, slope elevations 622-644,  
viewed from u/s, prior to treatment  
19 Jul 1988, Station 2+32 - 2+44, bench elevation 621-622,  
viewed from D/S



19 Jul 1988, Station 2+32 - 2+44, bench elevation 621-622,  
viewed from U/S  
22 Jun 1988, Station 2+44 - 2+5, slope elevation 597-621  
viewed from U/S, prior to treatment

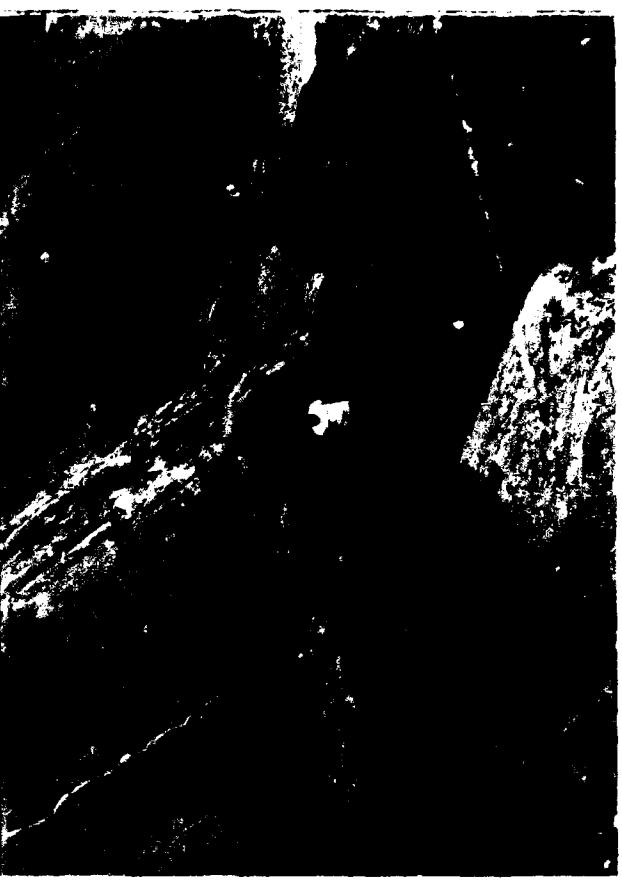


19 Jul 1988, Station 2+09 - 2+32, slope elevations 622-644,  
viewed from u/s, prior to treatment  
19 Jul 1988, Station 2+32 - 2+44, bench elevation 621-622,  
viewed from D/S





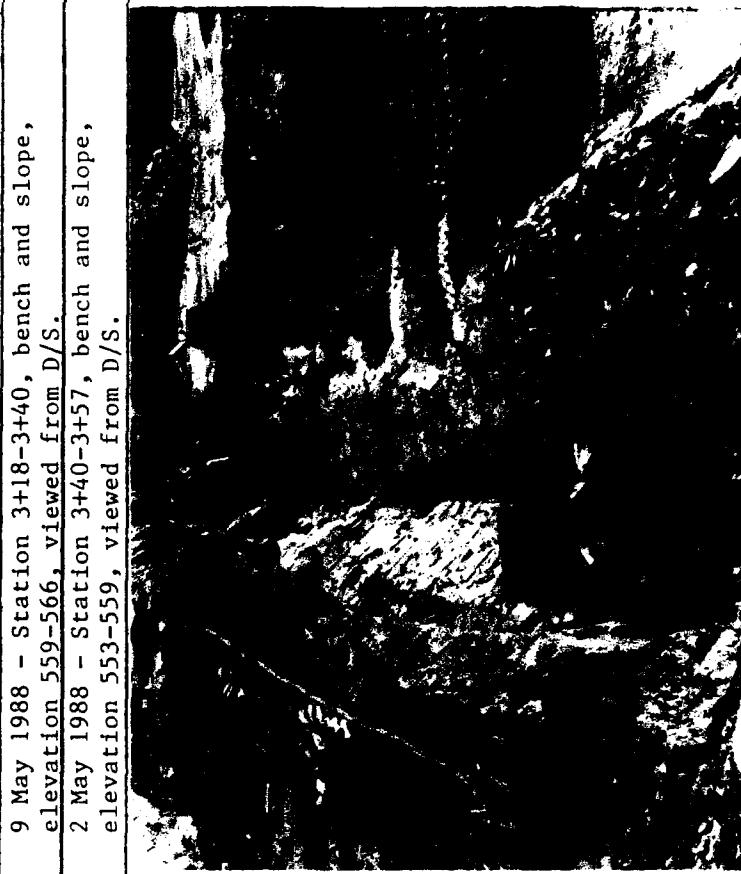
22 Jun 1988, Station 2+65 - 2+79, bench elevation 594-597,  
viewed from U/S, prior to treatment.  
19 May 1988, Station 3+00 - 3+18, bench elevation 566-574,  
viewed from U/S, prior to treatment.





9 May 1988 - Station 3+18-3+40, bench and slope, elevation 559-566, viewed from U/S, prior to dental concrete.

2 May 1988 - Station 3+40-3+57, bench and slope, elevation 553-559, viewed from U/S.



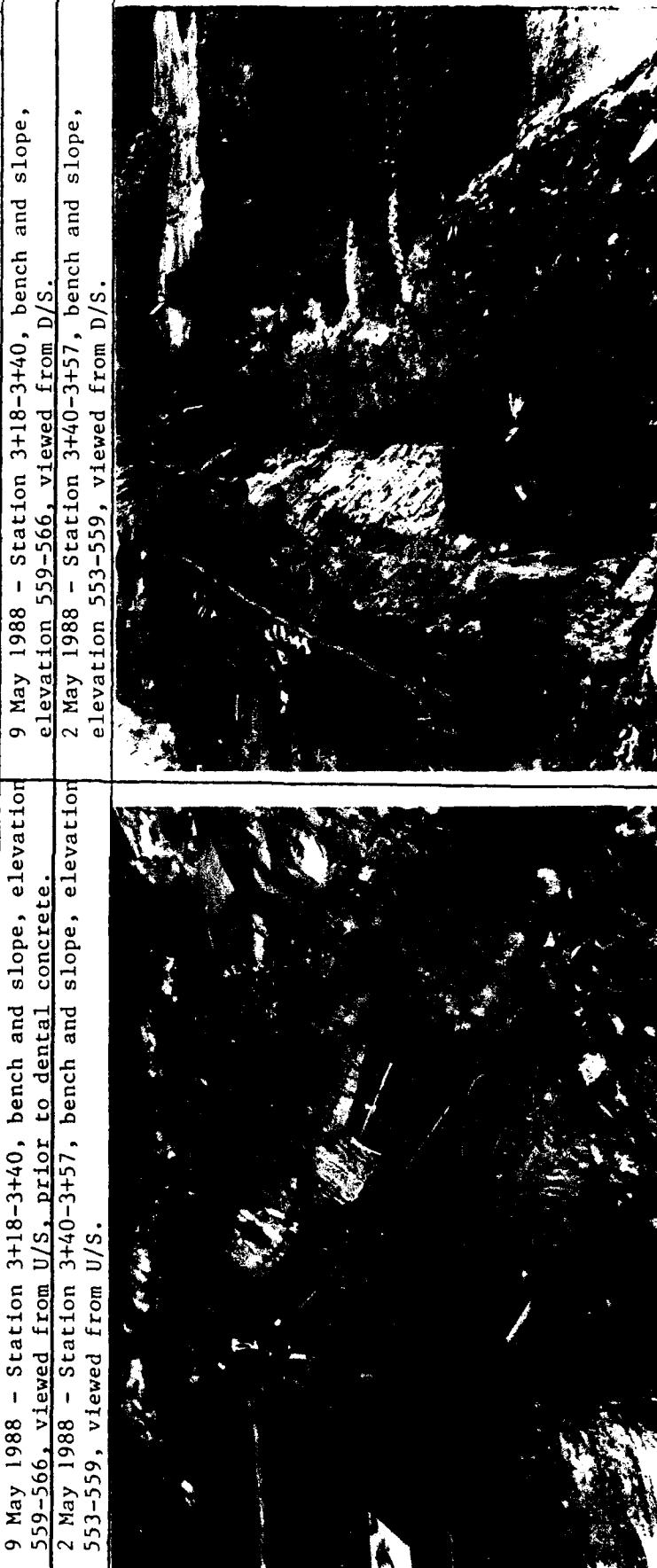
9 May 1988 - Station 3+18-3+40, bench and slope, elevation 559-566, viewed from D/S.

2 May 1988 - Station 3+40-3+57, bench and slope, elevation 553-559, viewed from D/S.



9 May 1988 - Station 3+18-3+40, bench and slope, elevation 559-566, viewed from U/S, prior to dental concrete.

2 May 1988 - Station 3+40-3+57, bench and slope, elevation 553-559, viewed from U/S.





28 Apr 1988 - Station 3+56-3+80, bench and slope, elevation 545-554, viewed from U/S, prior to treatment.

11 Apr 1988 - Station 3+80-4+30, benches and slopes, elevation 532-545, viewed from U/S, during treatment.





21 Mar 1988 - Station 5+20-5+60, slope and bench, elevation 521-526, viewed from D/S, prior to dental grout.

27 Mar 1988 - Station 6+00-7+00, benches, elevation 526-535, viewed from left abutment, prior to treatment.



21 Mar 1988 - Station 5+60-6+00, bench and slope, elevation 521-526, prior to dental grout.

15 Apr 1988 - Station 7+03-7+14, slope, elevation 538-545, viewed from D/S.





25 Apr 1988 - Station 7+14-7+49, bench and slope, elevation 545-557, viewed from D/S, prior to treatment.  
9 May 1988 - Station 7+49-7+81, bench and slope, elevation 557-562, viewed from D/S, prior to treatment.





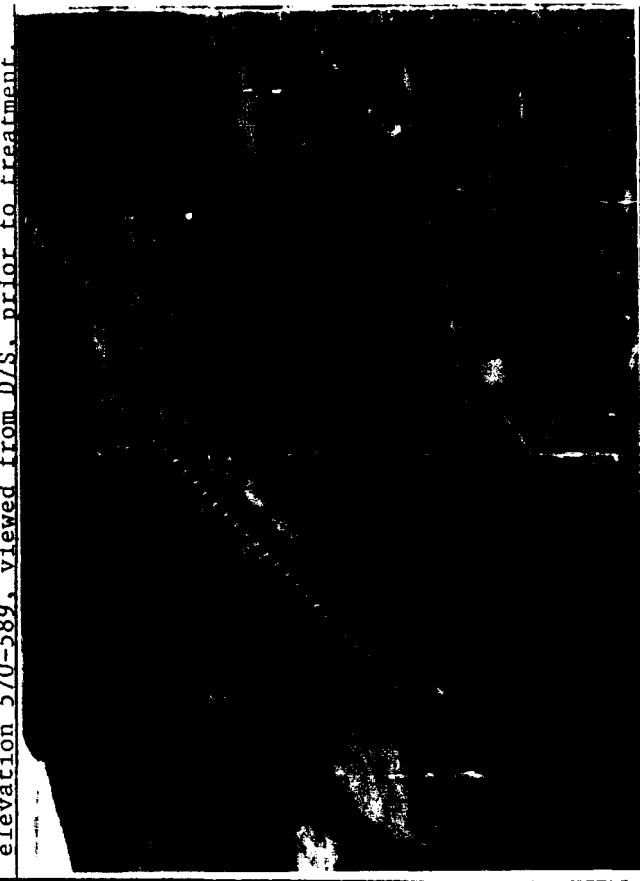
17 May 1988 - Station 7+81-8+18, bench and slope, elevation 562-570, viewed from U/S, prior to treatment.

20 May 1988 - Station 8+18-8+48, bench and slope, elevation 570-589, viewed from U/S, prior to treatment.



17 May 1988 - Station 7+81-8+18, bench and slope, elevation 562-570, viewed from U/S, prior to treatment.

20 May 1988 - Station 8+18-8+48, bench and slope, elevation 570-589, viewed from D/S, prior to treatment.



17 May 1988 - Station 7+81-8+18, bench and slope, elevation 562-570, viewed from D/S, prior to treatment.

20 May 1988 - Station 8+18-8+48, bench and slope, elevation 570-589, viewed from D/S, prior to treatment.

17 May 1988 - Station 7+81-8+18, bench and slope, elevation 562-570, viewed from D/S, prior to treatment.

20 May 1988 - Station 8+18-8+48, bench and slope, elevation 570-589, viewed from D/S, prior to treatment.



13 June 1988 - Station 8+48-8+68, bench and slope, elevation 604, elevation 584-604, viewed from D/S.  
28 Jun 1988 - Station 8+77-9+02, slope, elevation 604-631, viewed from U/S, prior to dental grout.

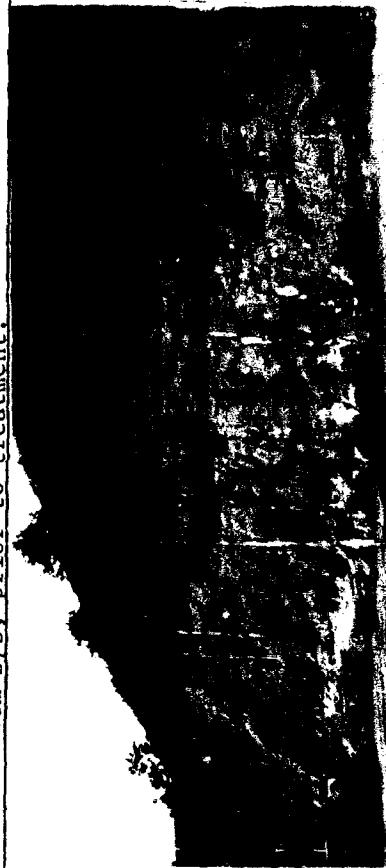


28 Jun 1988 - Station 8+68-8+77, bench, elevation 604, viewed from D/S, prior to treatment  
28 Jun 1988 - Station 8+77-9+02, slope, elevation 604-631, viewed from D/S, prior to dental concrete.





1 Aug 1988 - Station 9+02-9+09, bench, elevation 631-632,  
viewed from U/S, prior to treatment.  
22 Aug 1988 - Station 9+26-9+30, bench, elevation 649-650,  
viewed from D/S.



1 Aug 1988 - Station 9+09-9+26, slope, elevation 632-649,  
viewed from U/S, prior to treatment.  
22 Aug 1988 - Station 9+30-9+58, slope, elevation 650-679,  
viewed from D/S, prior to treatment.





2 Oct 1987 - D/S of dam core, valley bottom, left side,  
viewed from D/S.



2 Oct 1987 - D/S of dam core, valley bottom, left side,  
viewed from U/S.



2 Oct 1987 - D/S of dam core, valley bottom, right side,  
viewed from D/S.



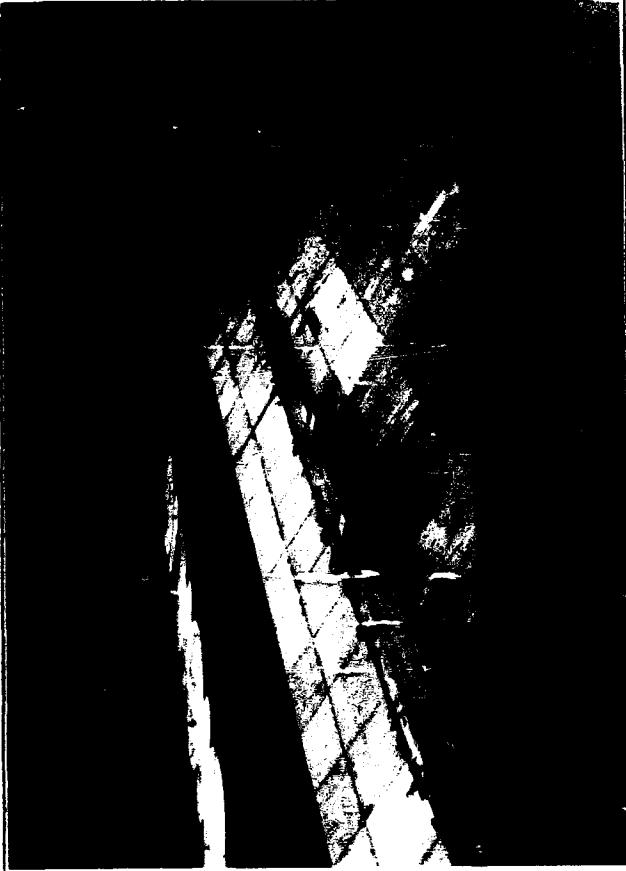
2 Oct 1987 - D/S of dam core, valley bottom, right side,  
viewed from U/S.



28 Sep 1987 - D/S of dam core, left abutment.

11 Oct 1987 - D/S of dam core, right abutment, above elevation 545.

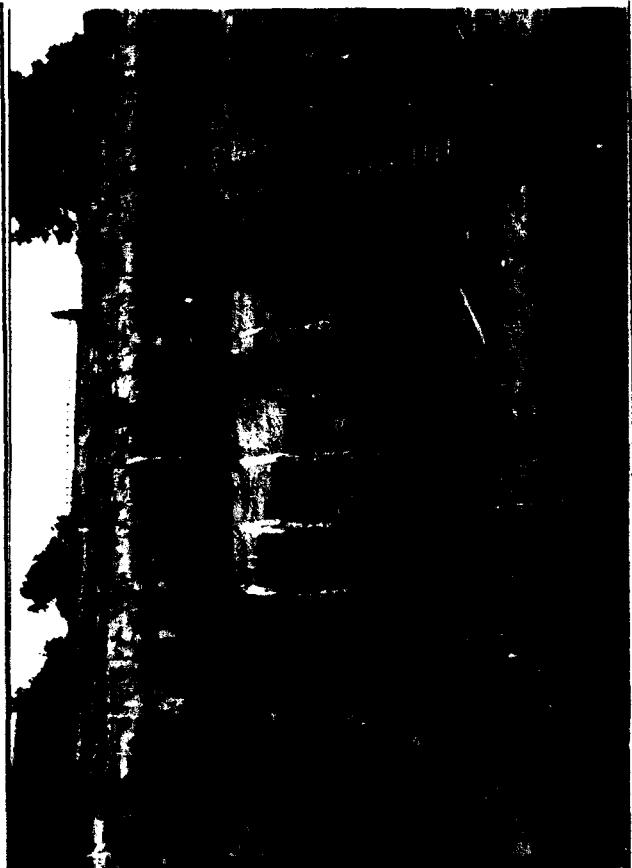
3 Jun 1987 - U/S of dam core, right abutment.





16 Jun 1987 - Spillway bridge inclined leg foundation and liner, right wall, foundation #1.

14 Aug 1987 - Right spillway wall.



16 Jun 1987 - Spillway bridge inclined leg foundation and liner, left wall, foundation #2.

14 Aug 1987 - Left spillway wall.



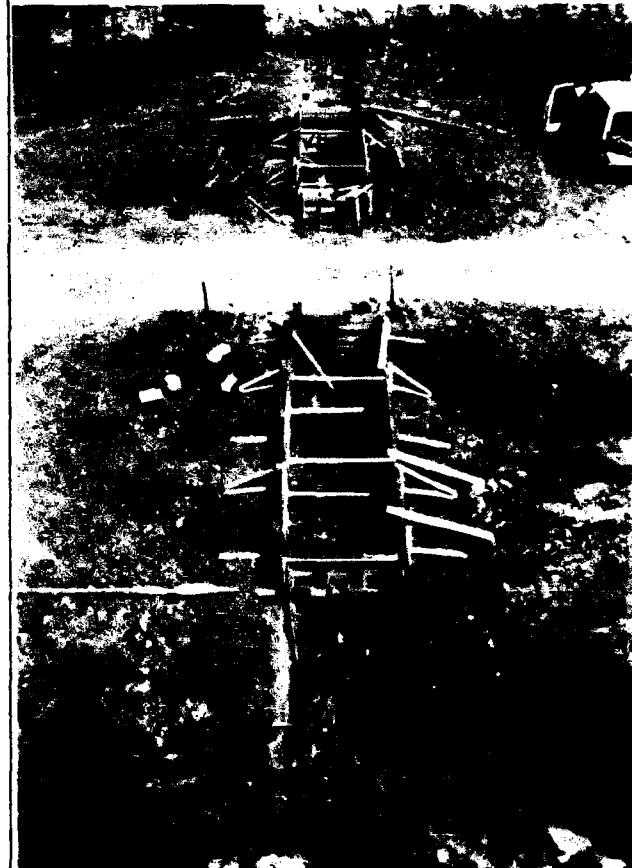
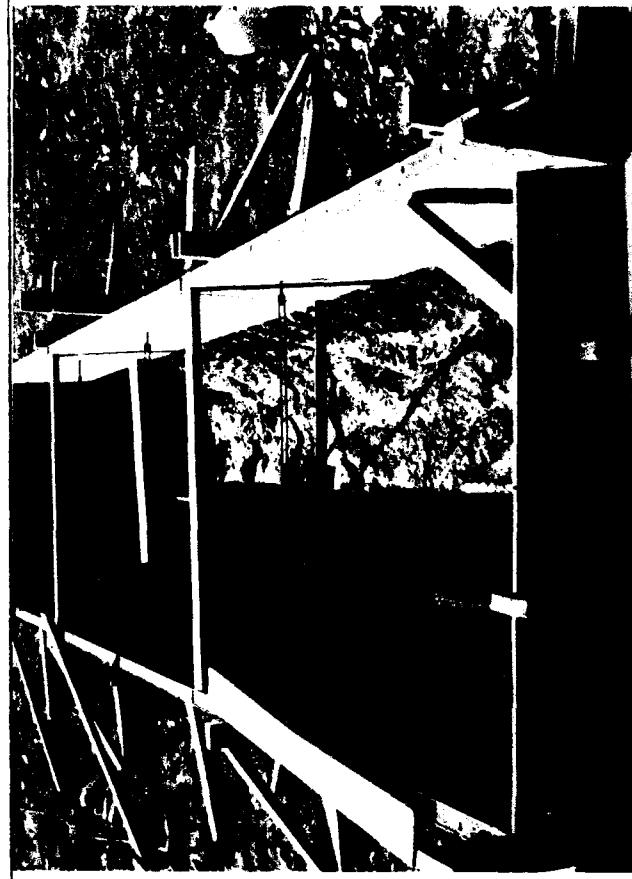


5 May 1987 - Spillway bridge abutment, foundation #1, prior to cleaning.

11 Jun 1987 - Spillway sill



6 May 1987 - Spillway bridge abutment, foundation #2.  
11 Jun 1987 - Typical spillway sill monolith, monolith #4.





5 Nov 1987 - Service bridge abutment, base elevation 672, right side.



5 Nov 1987 - Service bridge abutment, base elevation 665, right side.



5 Nov 1987 - Service bridge abutment, base elevation 672, left side.



5 Nov 1987 - Service bridge abutment, base elevation 665, left side.

FOUNDATIONS - SERVICE BRIDGE

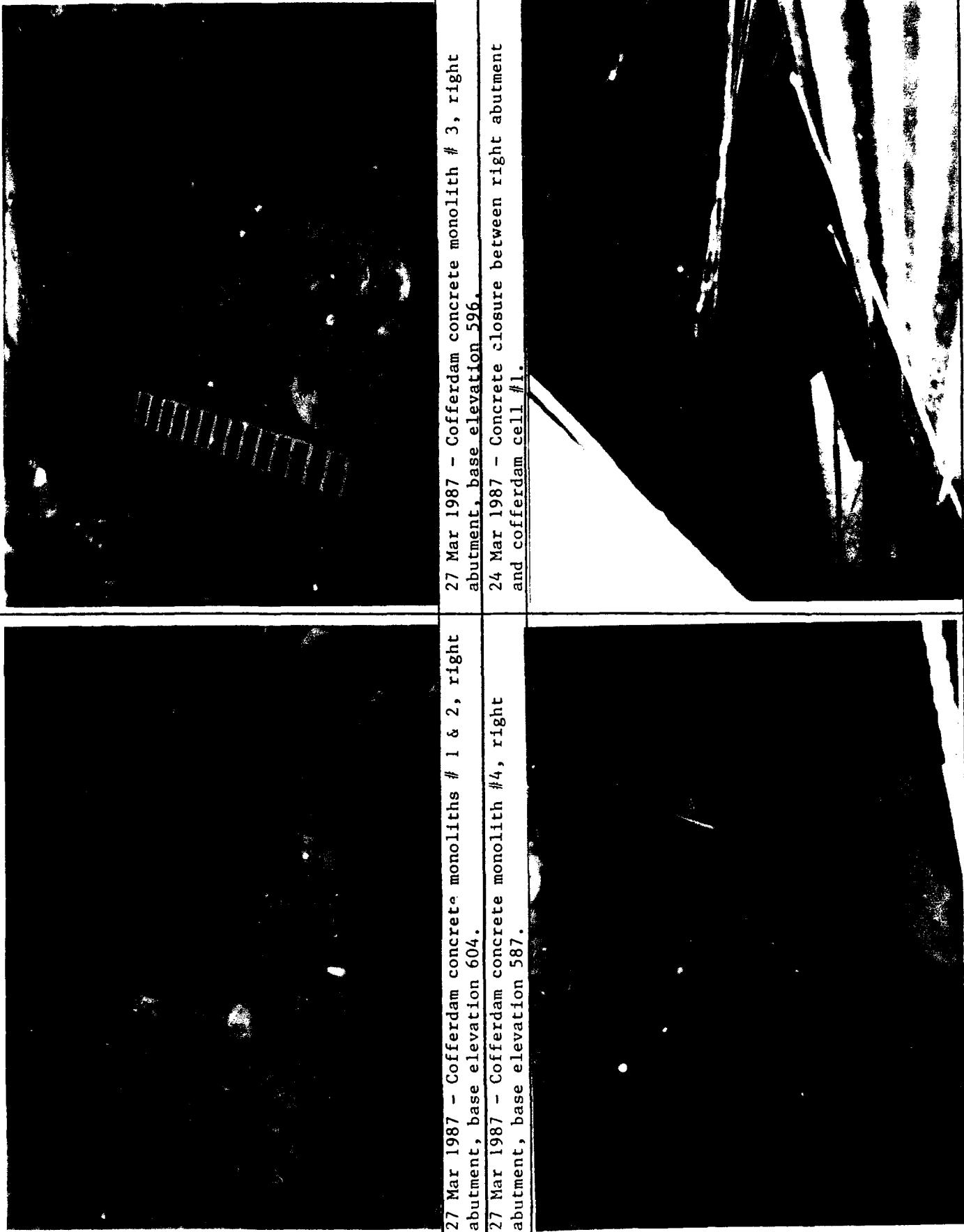
FOUNDATIONS - COFFERDAM

27 Mar 1987 - Cofferdam concrete monoliths # 1 & 2, right abutment, base elevation 604.

27 Mar 1987 - Cofferdam concrete monolith #4, right abutment, base elevation 587.

27 Mar 1987 - Cofferdam concrete monolith # 3, right abutment, base elevation 596.

24 Mar 1987 - Concrete closure between right abutment and cofferdam cell #1.

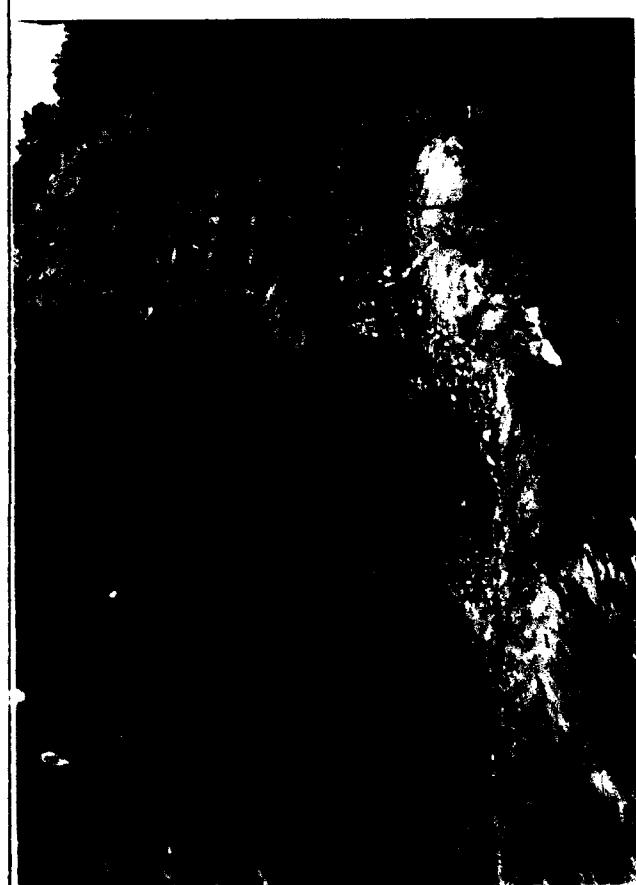




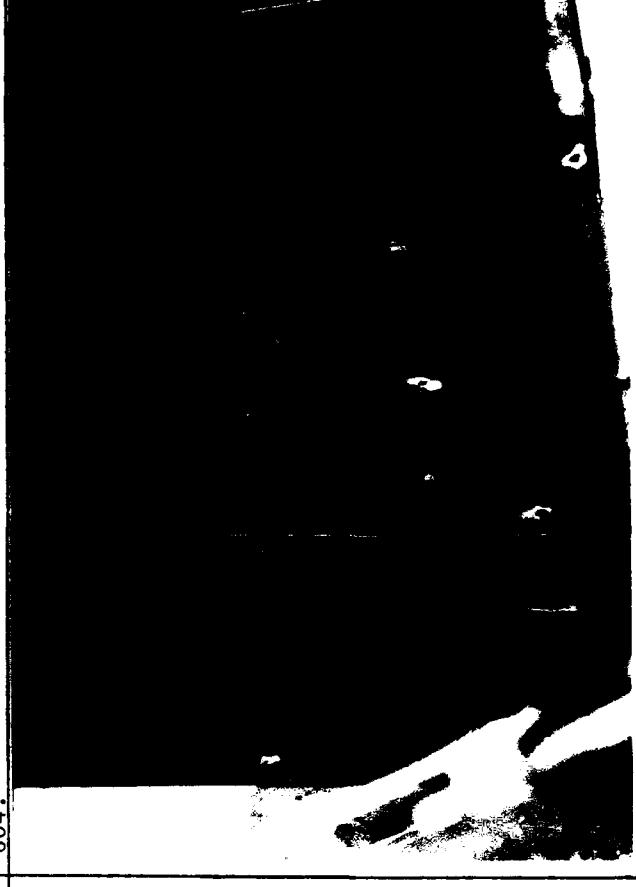
15 Sep 1987 - Cofferdam concrete monolith #5, sidewall.



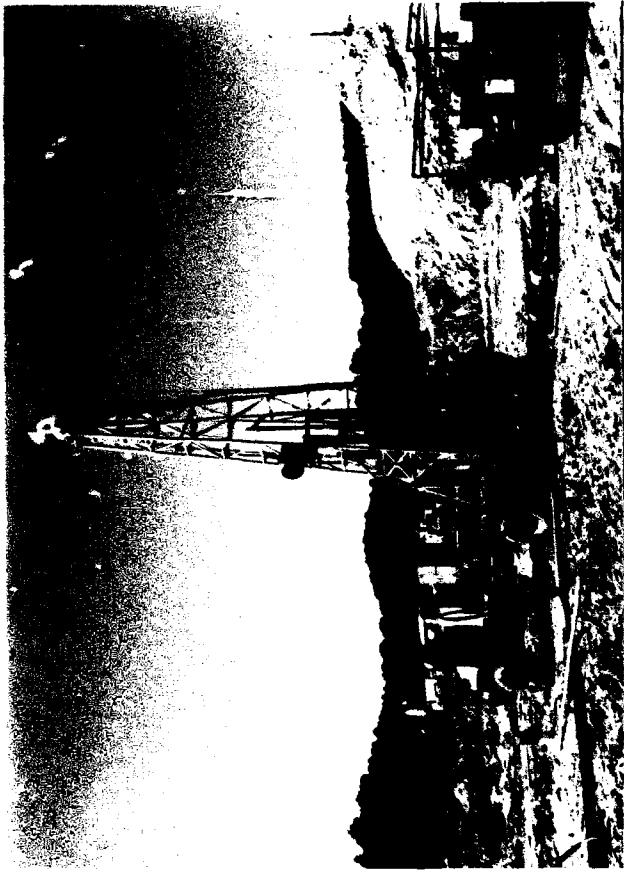
16 Sep 1987 - Cofferdam concrete monolith #5, base elevation 574, prior to cleaning.



15 Sep 1987 - Cofferdam concrete monolith #6, sidewall.  
604.



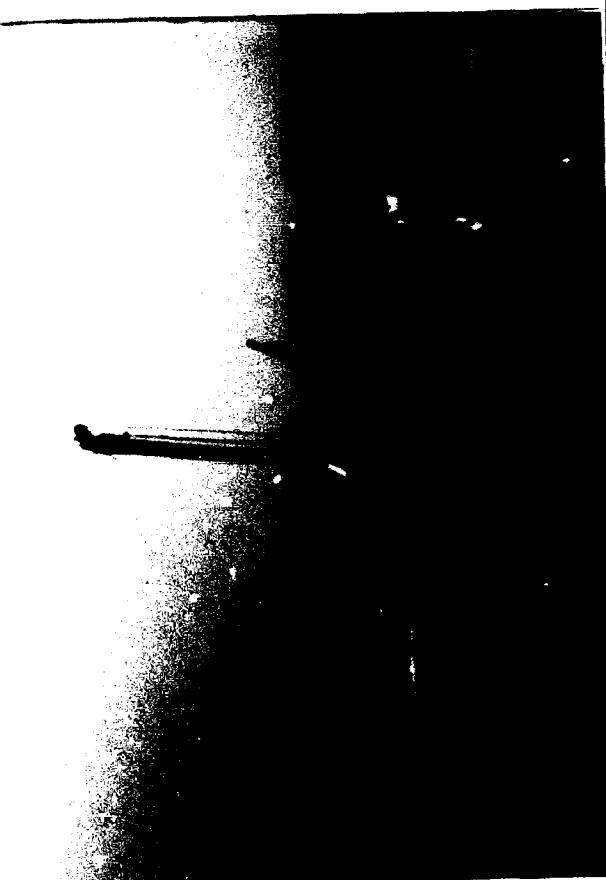
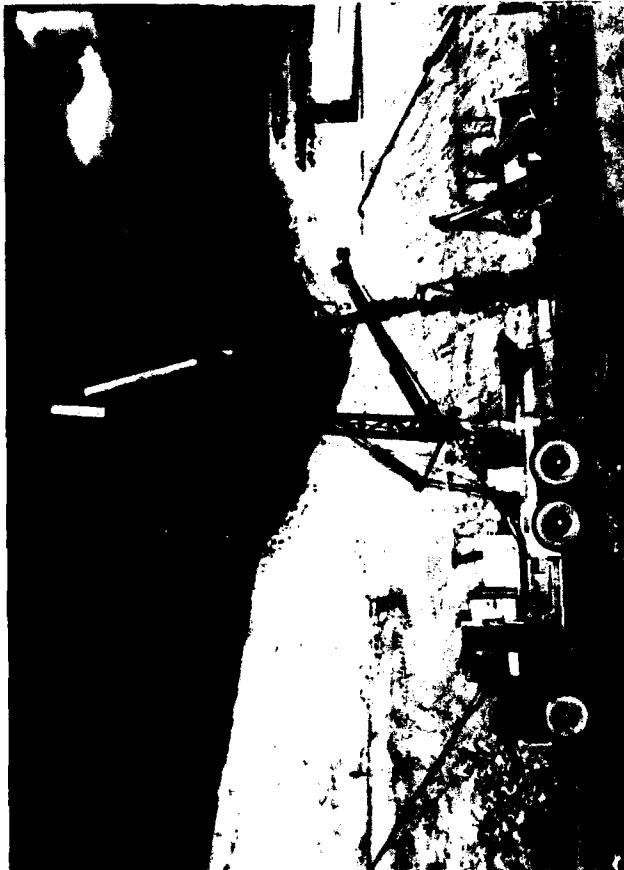
5 Oct 1987 - Cofferdam concrete monolith #6, base elevation



29 Aug 1986 - Drilling dewatering wells with a Gus Peck "Super George" bucket auger.  
28 Aug 1986 - Developing dewatering wells by air lifting and surging.



8 Sep 1986 - Drilling for installation of piezometers with a Mobile drill.  
8 Sep 1986 - Testing well water for sand content with a Rossum sand tester.





6 Sep 1986 - Dewatering well header and electrical panel.  
19 Sep 1986 - Dewatering well system.



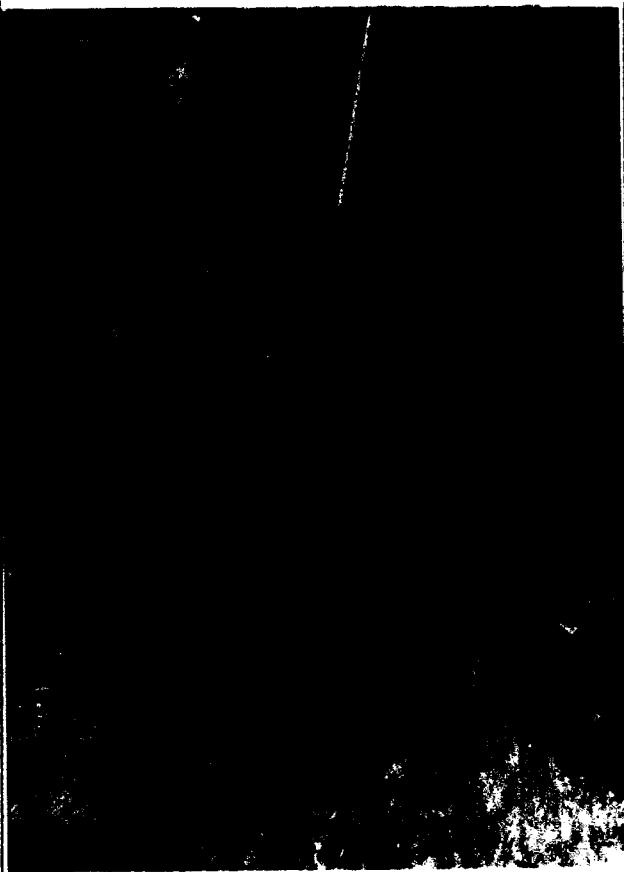
29 Sep 1986 Discharge point for dewatering well D/S of the cofferdam.





3 Sep 1986 - Upstream slurry cutoff wall after backfilling, prior to capping, viewed from right abutment.

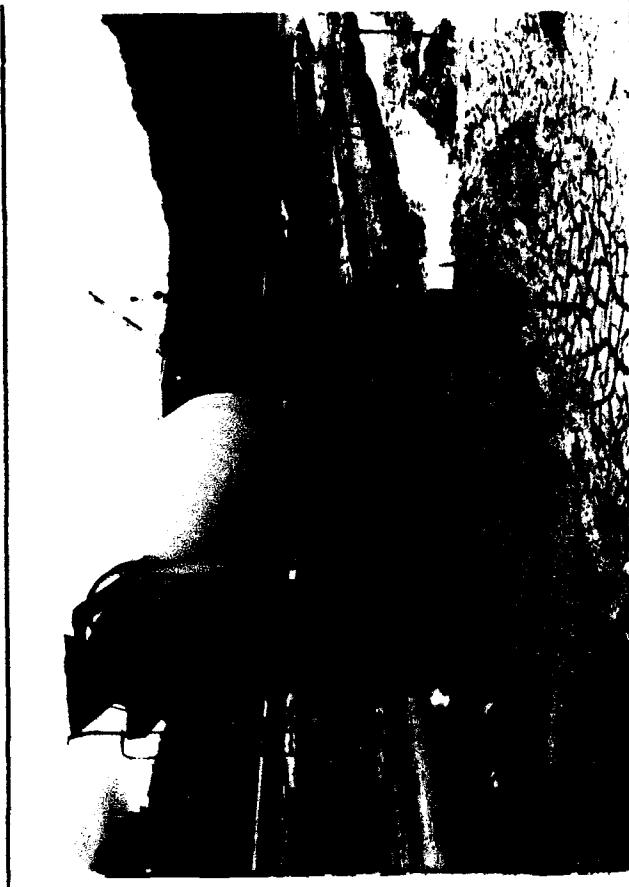
24 Sep 1986 - Downstream slurry cutoff wall after excavation, prior to backfilling, viewed from left abutment.



30 Jul 1986 - Backhoe used during trench excavation, slurry mixing ponds (center), bentonite storage bin (left)



DEMATERING SYSTEM - SLURRY CUTOFF WALLS



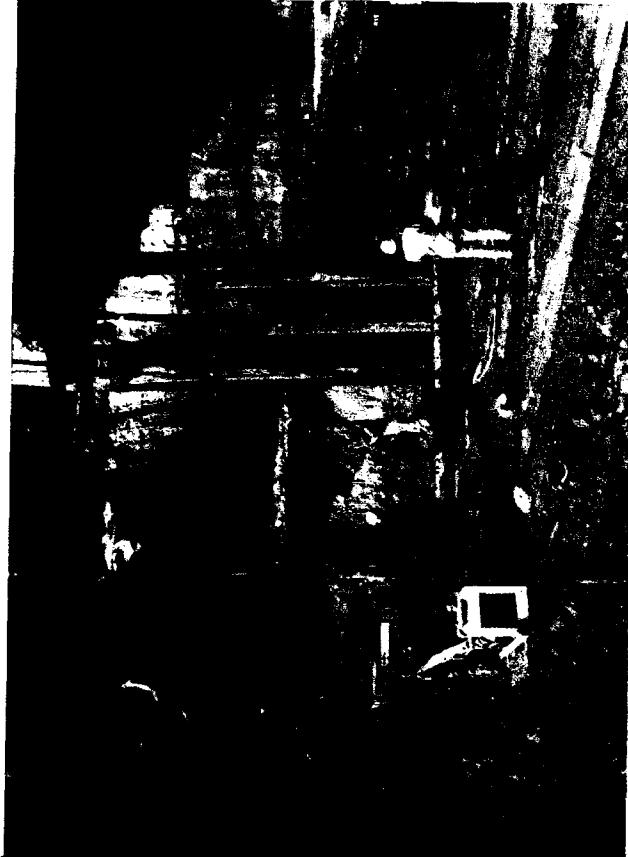
6 Aug 1986 - Excavating and air lifting the upstream slurry cutoff wall.  
27 Sep 1986 - Batch plant used to dispense backfill material.



28 Aug 1986 - Placing backfill material in the upstream slurry cutoff wall.  
22 Oct 1986 - Mixing and placing backfill material for the downstream slurry cutoff wall.



DEMATERING SYSTEM - SLURRY CUTOFF WALL



6 Sep 1986 - Capping and covering the upstream slurry cutoff wall, prior to placing impervious blanket.

27 Aug 1986 - Placing impervious plug over the D/S slurry wall in the diversion channel, after stream diversion.

10 Nov 1986 - Driving "Z" piling into the downstream slurry cutoff wall.

23 Sep 1987 - excavated section of the upstream leg of the downstream slurry cutoff wall.



DEMATERICING SYSTEM - SLURRY CUTOFF WALL



27 May 1986 - Initial stripping of residual soils along left abutment of dam.

27 May 1987 - Boulders encountered during overburden excavation at the dam site.

June 1986 - Excavating clays in the valley bottom, at the dam site, towards the left abutment.

28 May 1987 - Typical overburden excavation at the dam site, viewed from the right abutment.



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#### OVERBURDEN EXCAVATION



27 May 1986 - Drilling and loading pre-split holes, left sidewall of diversion channel.

3 Sep 1987 - Excavating shot rock at left abutment of dam.

6 May 1987 - Drilling for production blasting in spillway.

9 Sep 1987 - Loading explosives for boulder removal at dam site, during overburden excavation.



#### ROCK EXCAVATION



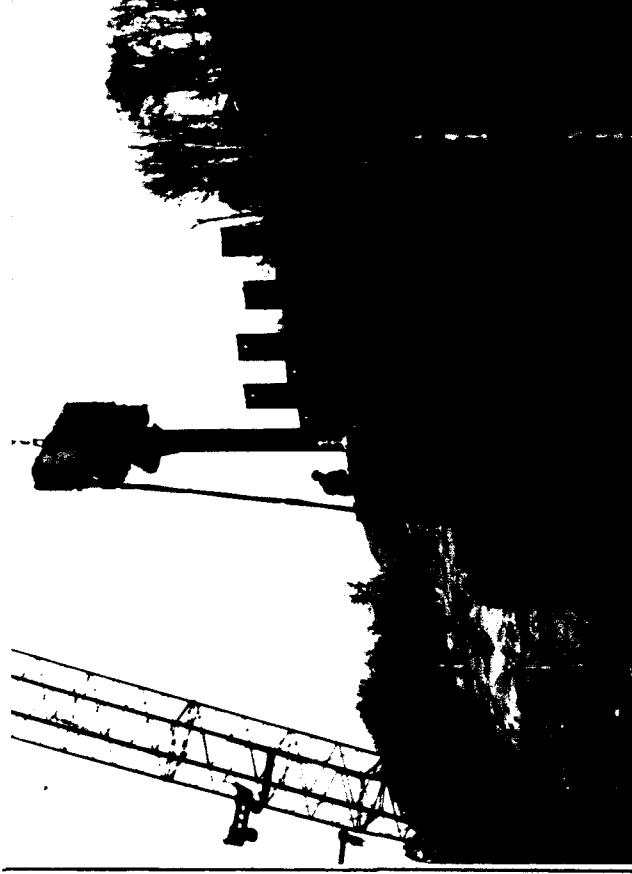
5 Nov 1987 - Line drilling results in service bridge abutment.

21 Jul 1988 - Loading ANFO into production holes in Rock Borrow Area #1.

13 Apr 1988 - Drilling for production blasting in Rock Borrow Area #1.

6 May 1988 - Excavating shot rock from Rock Borrow Area #1.





Nov 1986 - Vibratory hammer used to drive piling.

13 Nov 1986 - Template used for sheet pile driving at cells (set up at cell #3)

Nov 1986 - Diesel hammer used to drive piling.



18 Dec 1986 - Excavation of boulders encountered while driving piles for cell #5.



Nov 1986 - Vibratory hammer used to drive piling.

13 Nov 1986 - Template used for sheet pile driving at cells (set up at cell #3)

Nov 1986 - Diesel hammer used to drive piling.



18 Dec 1986 - Excavation of boulders encountered while driving piles for cell #5.



5 May 1987 - Key for base of the downstream concrete berm.



17 Dec 1987 - Completed cofferdam, viewed from right abutment, upstream.



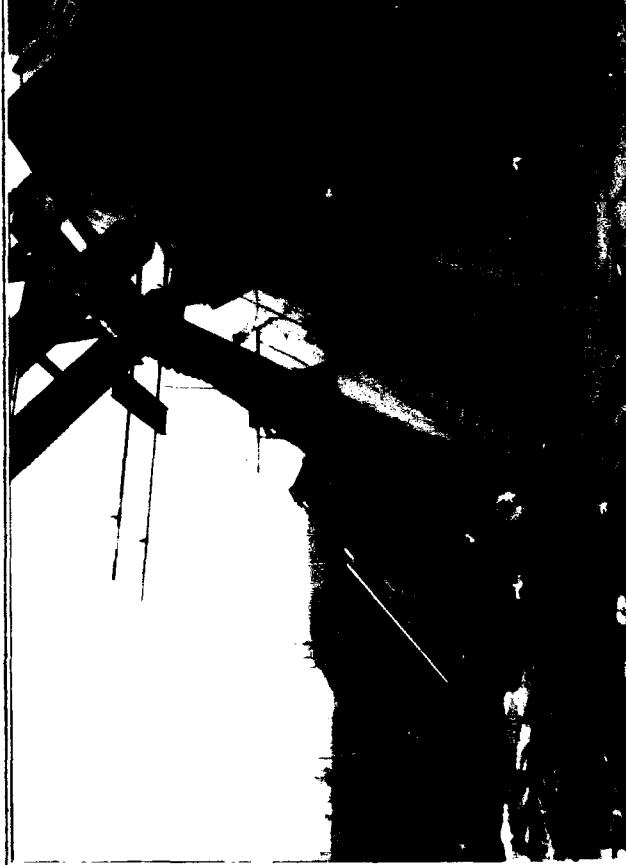
20 Mar 1987 - Filling sheet pile cells with bottom ash.



23 Sep 1987 - Nearly completed cofferdam, viewed from the left abutment, downstream.



16 Jun 1987 - Foundation #2  
13 Apr 1988 - Drilling drainage holes in spillway liner.



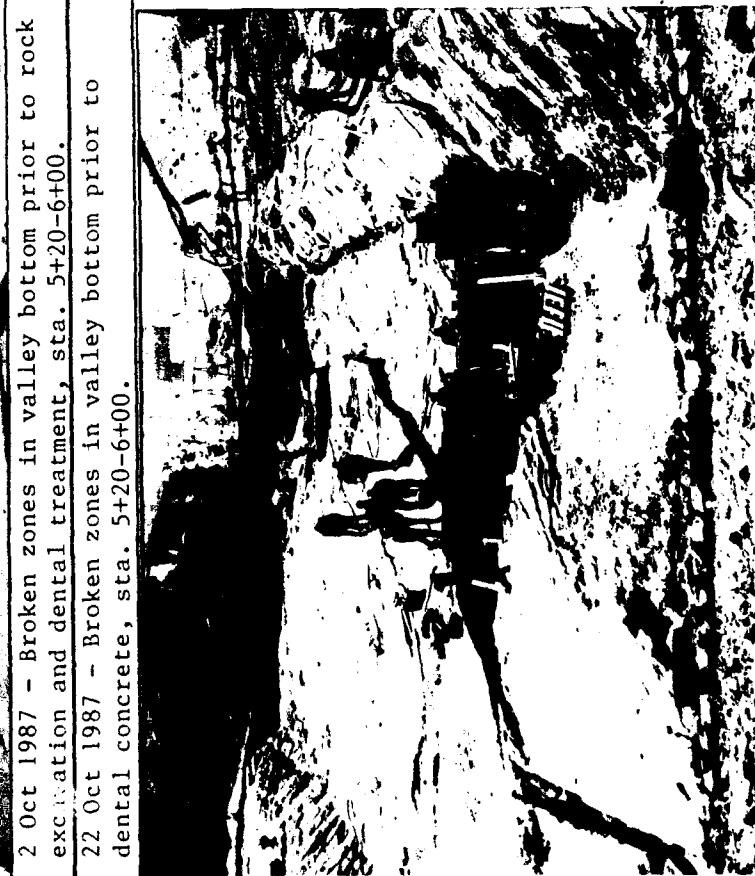
19 Jun 1987 - Installing anchor bars for spillway liner,  
foundation #1



FOUNDATION ANCHORS & DRAINAGE HOLES

<p>29 Mar 1988 - Preparing high angled joints for dental grout, station 6+05, elevation 526.</p> <p>20 May 1988 - Dental grout used to treat lithologic contact and joints at sta. 3+00-3+04, elevation 574.</p>	<p>28 Apr 1988 - Dental grout used to treat joints and bedding planes, stat. 3+64-3+80, elevation 545</p> <p>29 Mar 1988 - Dental grout used to treat bedding planes, at sta. 5+40-5+60, elevation 521</p>

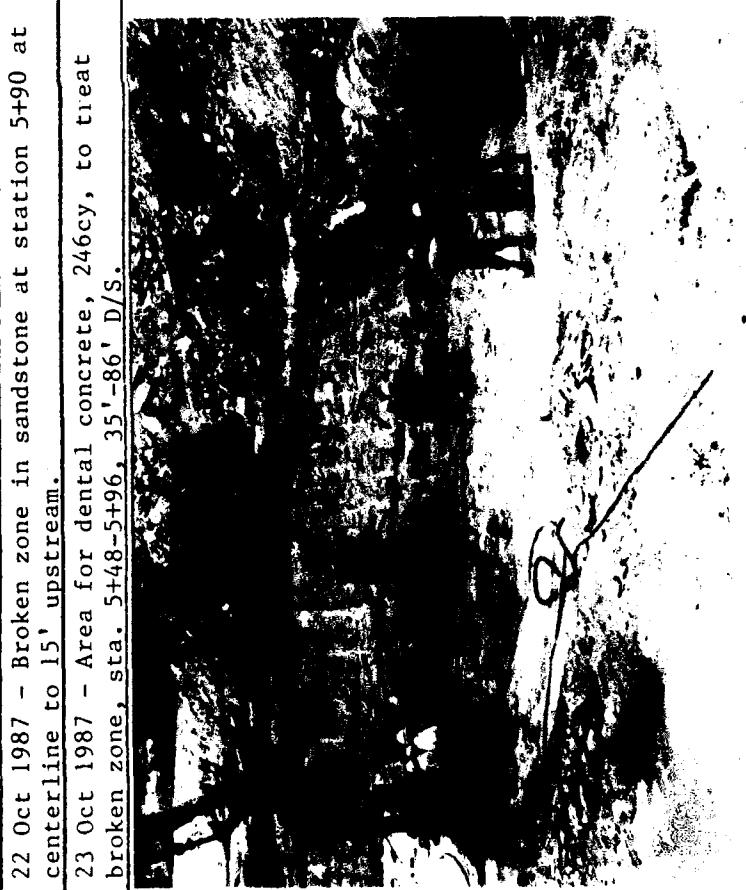
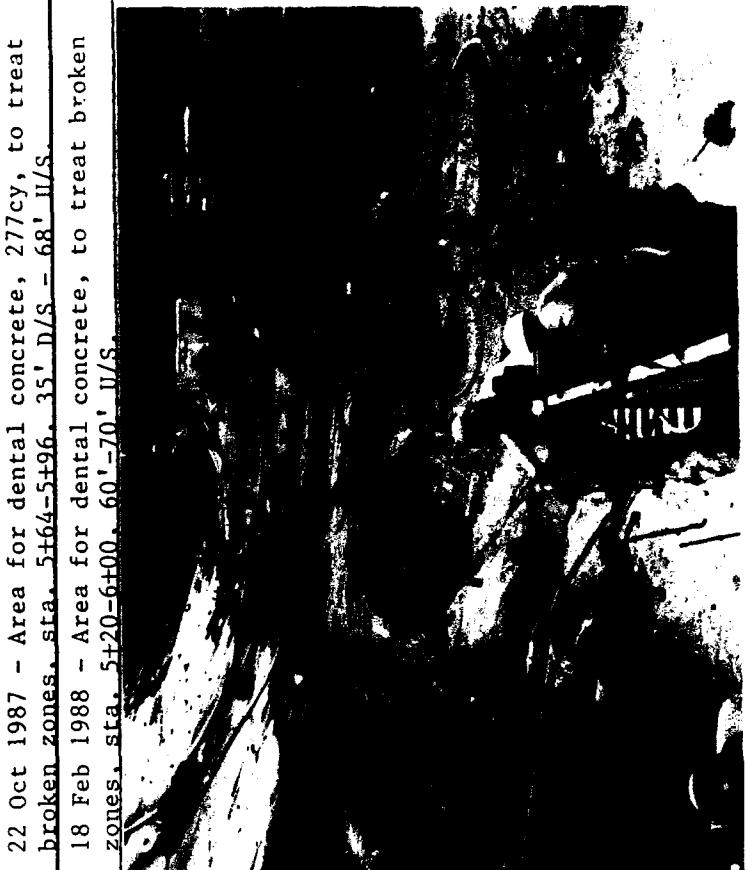
FOUNDATION TREATMENT - DENTAL GROUT



2 Oct 1987 - Broken zones in valley bottom prior to rock excavation and dental treatment, sta. 5+20-6+00.

22 Oct 1987 - Broken zones in valley bottom prior to dental concrete, station 5+20-6+00.





22 Oct 1987 - Broken zone in sandstone at station 5+90 at centerline to 15' upstream.

23 Oct 1987 - Area for dental concrete, 246cy, to treat broken zone, sta. 5+48-5+96, 35'-86' D/S.

22 Oct 1987 - Area for dental concrete, 277cy, to treat broken zones, sta. 5+64-5+96, 35' D/S - 68' U/S

18 Feb 1988 - Area for dental concrete, to treat broken zones, sta. 5+20-6+00, 60'-70' U/S



7 Mar 1988 - Area for dental concrete, 12cy, to treat broken zones, sta. 5+38-5+74, 40'-69' U/S.

8 Mar 1988 - Area for dental concrete, 6cy, to treat broken zone, sta. 5+43-5+53, 73'-91' D/S.



18 Mar 1988 - Area for dental concrete, 6cy, to treat broken zone, sta. 5+60-5+80, 24'-50' U/S.

15 Apr 1988 - Area for dental concrete, 3cy, to treat a thin shale seam, sta. 4+37-4+71, 2'-30' U/S.





10 Mar 1988 - Forms needed to place dental concrete, to treat a coal seam and underclays, sta. 3+79-3+89

7 Jun 1988 - Dental concrete placed, 6 cy, to treat poorly cemented sandstone, sta. 8+43-8+46.

3 May 1988 - Placing dental concrete, 8 cy, at sta. 7+75-7+79, to treat a coal seam and SS/Sh contact.  
8 Jul 1988 - Dental concrete placed, total of 28 cy, to treat a shale seam at sta. 8+84-8+88.





16 Mar 1988 - Drilling hole in "C" line on left abutment.

29 Mar 1988 - Drilling hole in "A" line on left abutment.



3 Nov 1987 - Drilling hole in "C" line on the valley bottom.

30 Nov 1987 - Drilling holes in "A" line on the valley bottom.



16 Mar 1988 - Drilling hole in "C" line on left abutment.

29 Mar 1988 - Drilling hole in "A" line on left abutment.





20 Apr 1988 - AW sized bits used during drilling.

16 Mar 1988 - Air Powered tugger used to mobilize and stabilize drills on slopes.



23 Nov 1987 - Artesian water flow in valley bottom, hole number C650.0PR, zone 2

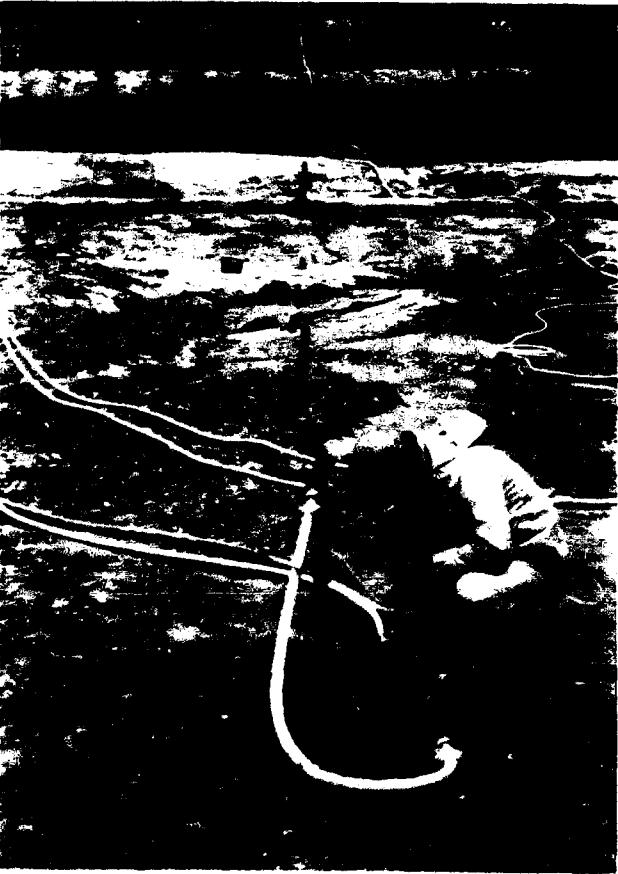
11 Oct 1987 - Pressure testing assembly (header) connected to an "A" line hole.





7 Oct 1987 - Grouting hole in "C" line in the valley bottom.

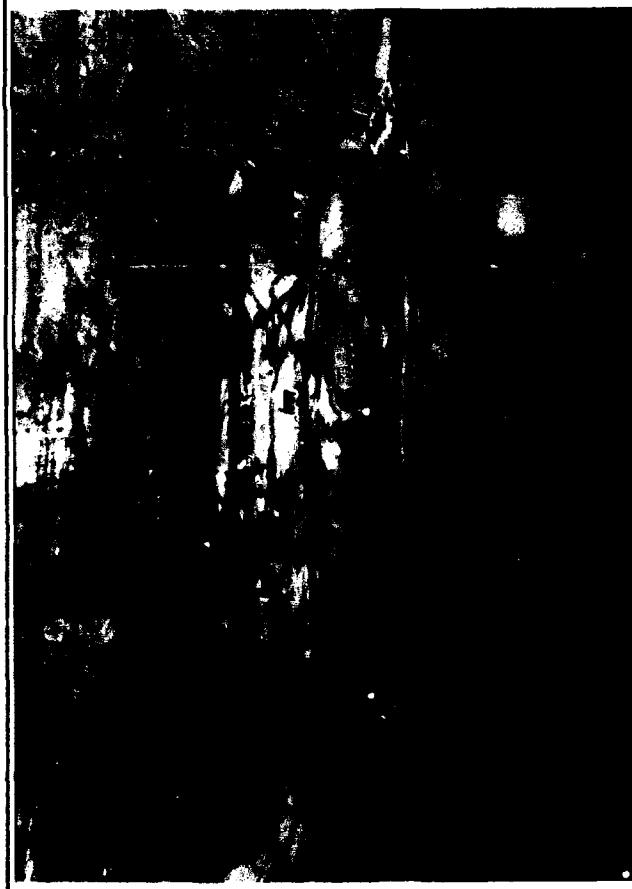
11 Oct 1987 - 10 cu. ft. colloidal type grout plant.  
(Chemgrout)



7 Oct 1987 - Grouting hole in "C" line on the valley bottom, interconnecting hole in background.

4 Apr 1988 - 30 cu. ft. tub type grout plant with sump, special made.





29 Mar 1988 - Initial placement of impervious material  
at elevation 521.

8 Jul 1988 - Placing and compacting dam embankment at  
elevation 610.



11 Apr 1988 - Compaction of dam embankment at elevation  
530, also shown are 3 sumps used to control ground water.

9 Sep 1988 - Nearly completed dam with embankment at  
elevation 676.



EMBANKMENT COMPACTION

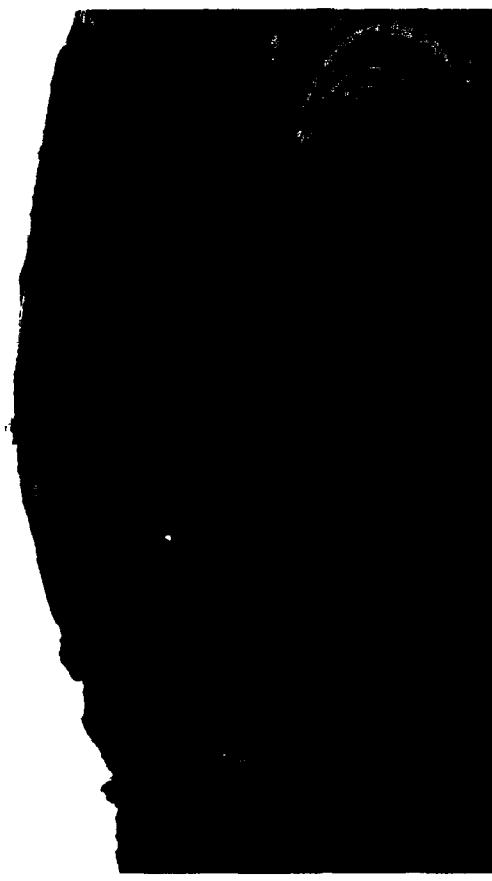


Oct 1986 - Rock Borrow Area #1, prior to rock excavation.

Sep 1986 - Impervious Borrow Area #1, prior to excavation.

14 Sep 1988 - Nearly completed excavation of Rock Borrow Area #1.

16 Jun 1988 - Nearly completed excavation of Impervious Borrow Area #1.

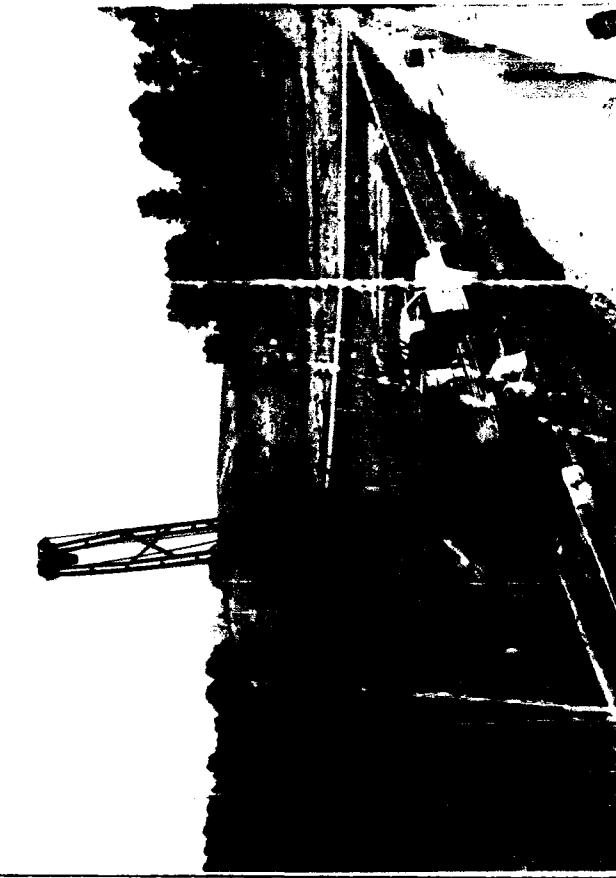


BORROW AREAS



16 Nov 1988 - Installing piezometers along crest of dam.

Jul 1989 - Piezometer



Jul 1989 - Installing piezometers at dam.

Jul 1989 - Survey monument



INSTRUMENTATION



24 Aug 1988 - Service bridge at intake structure.



July 1986 - Temporary stream diversion channel.

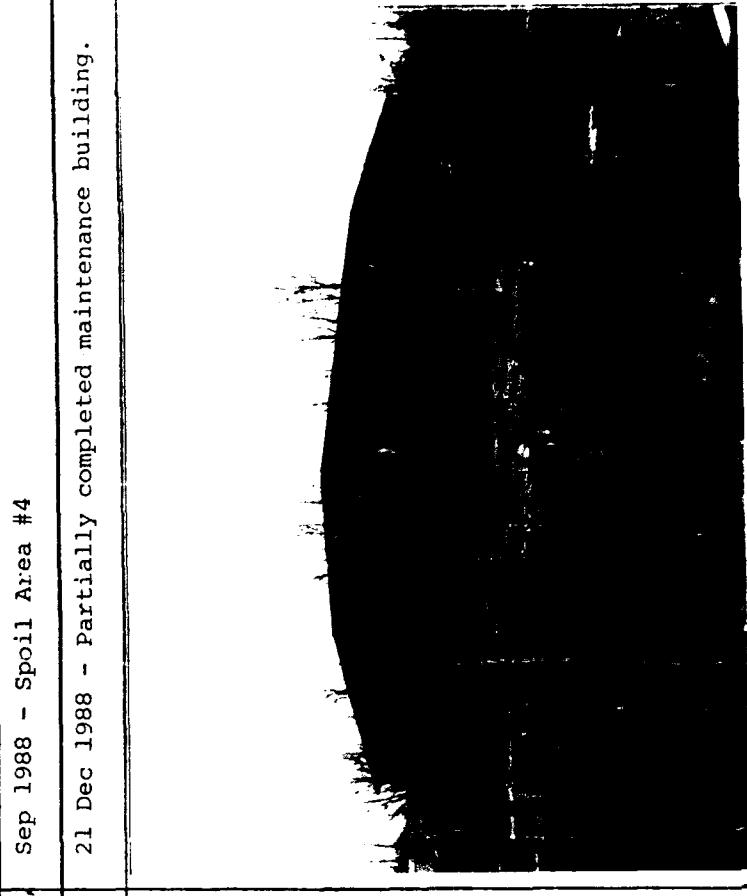
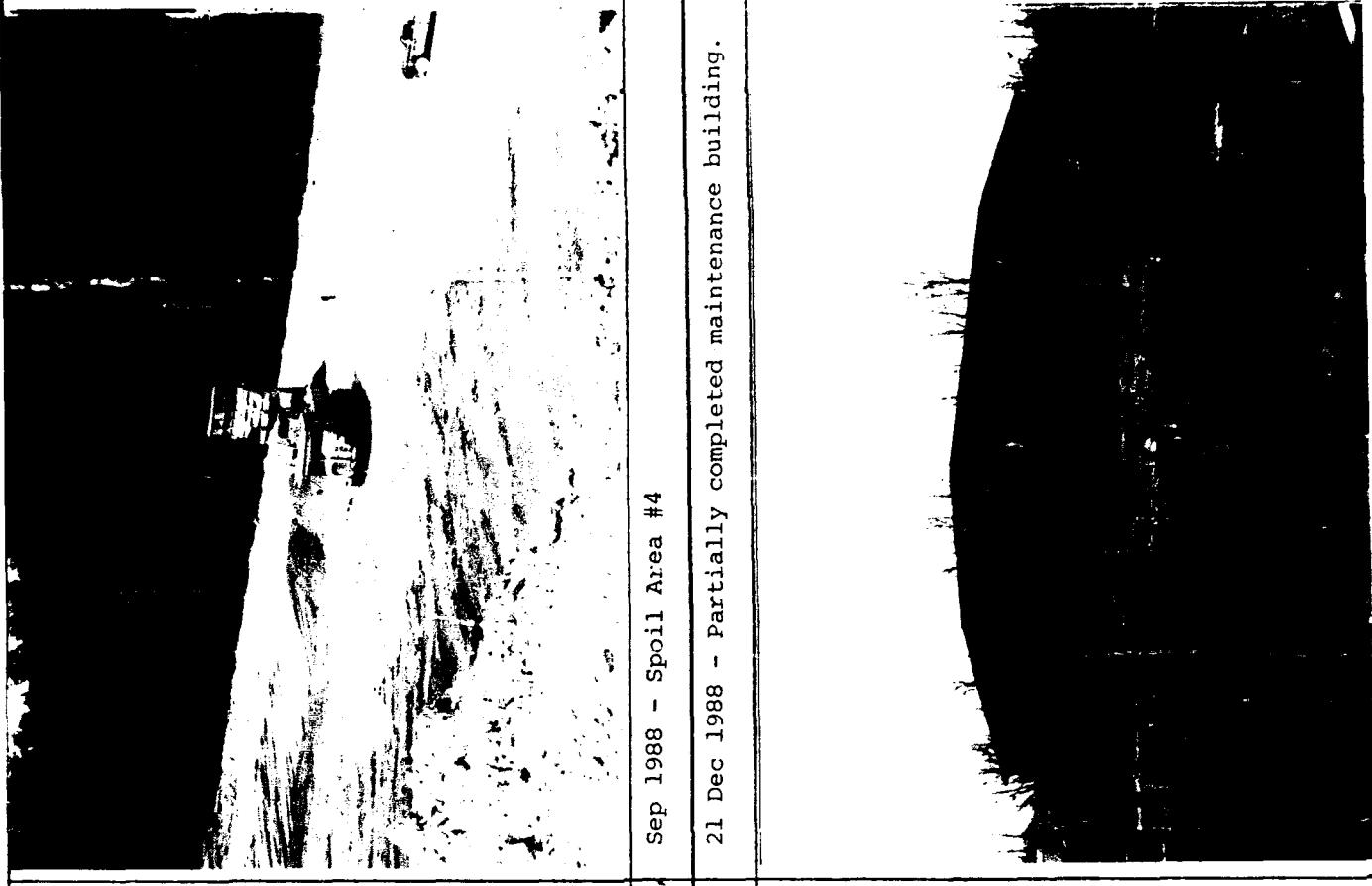
16 Mar 1988 - Spillway bridge



16 Nov 1988 - Area downstream of the dam.



MISCELLANEOUS



14 Sep 1988 - Impervious Borrow Area #1 and Spoil Area #4  
which will be the future Barker Boat Ramo.  
16 Nov 1988 - Access Road

Sep 1988 - Spoil Area #4  
21 Dec 1988 - Partially completed maintenance building.



MISCELLANEOUS